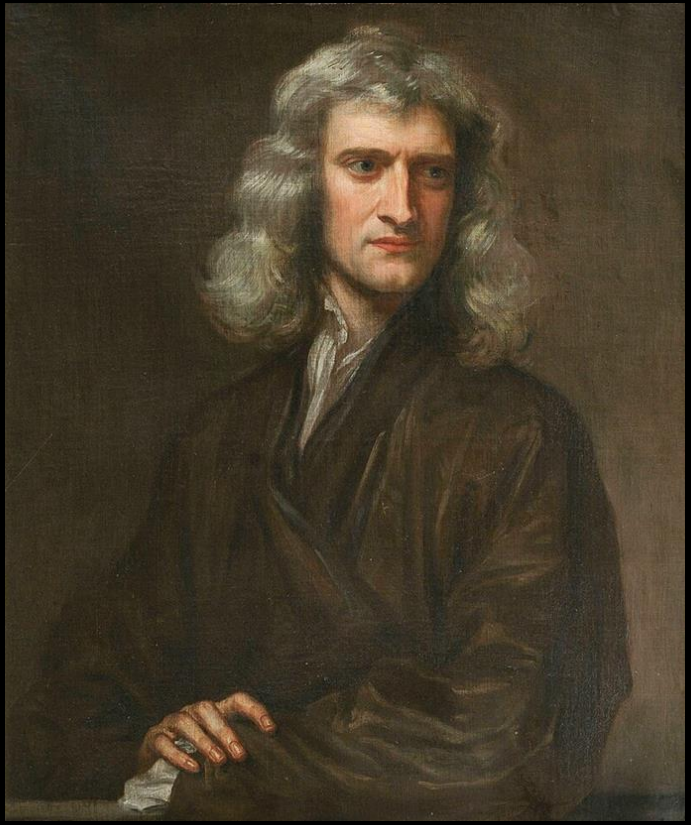
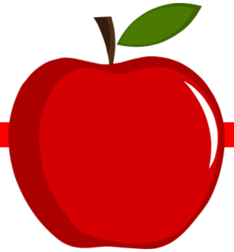
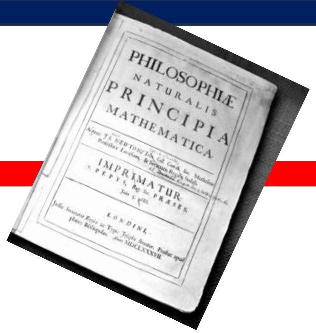
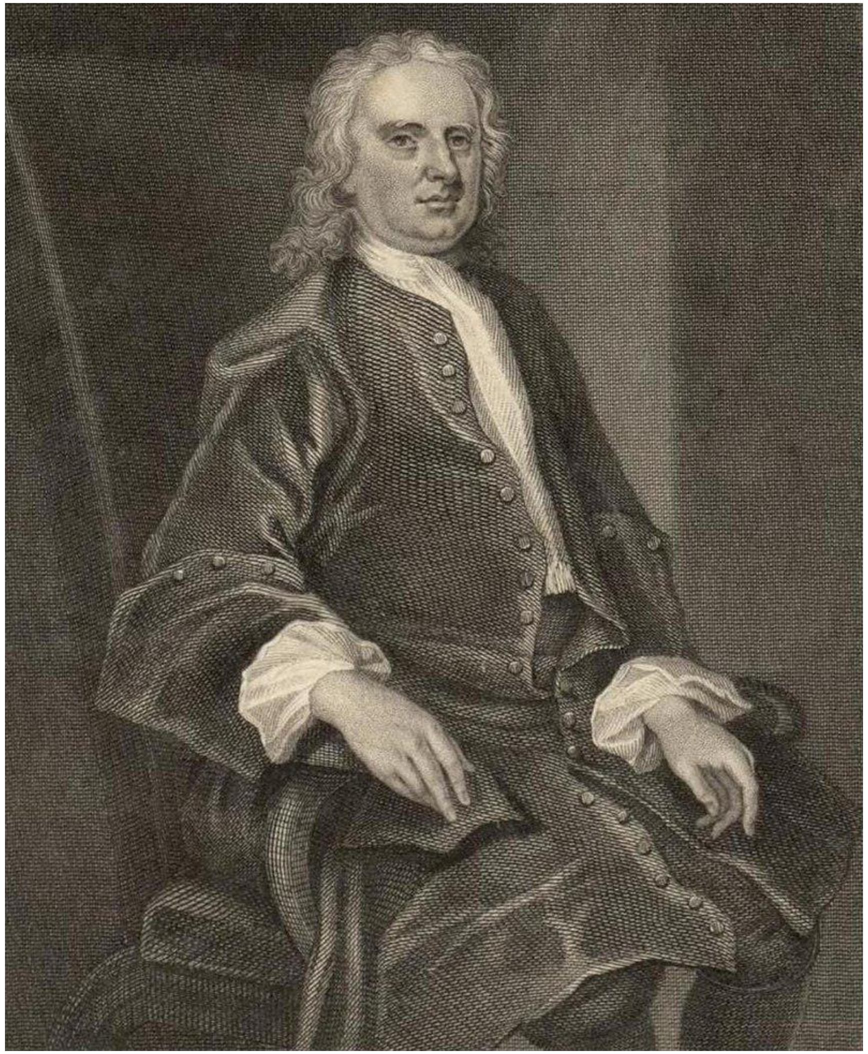
Isaac Newton





Isaac Newton

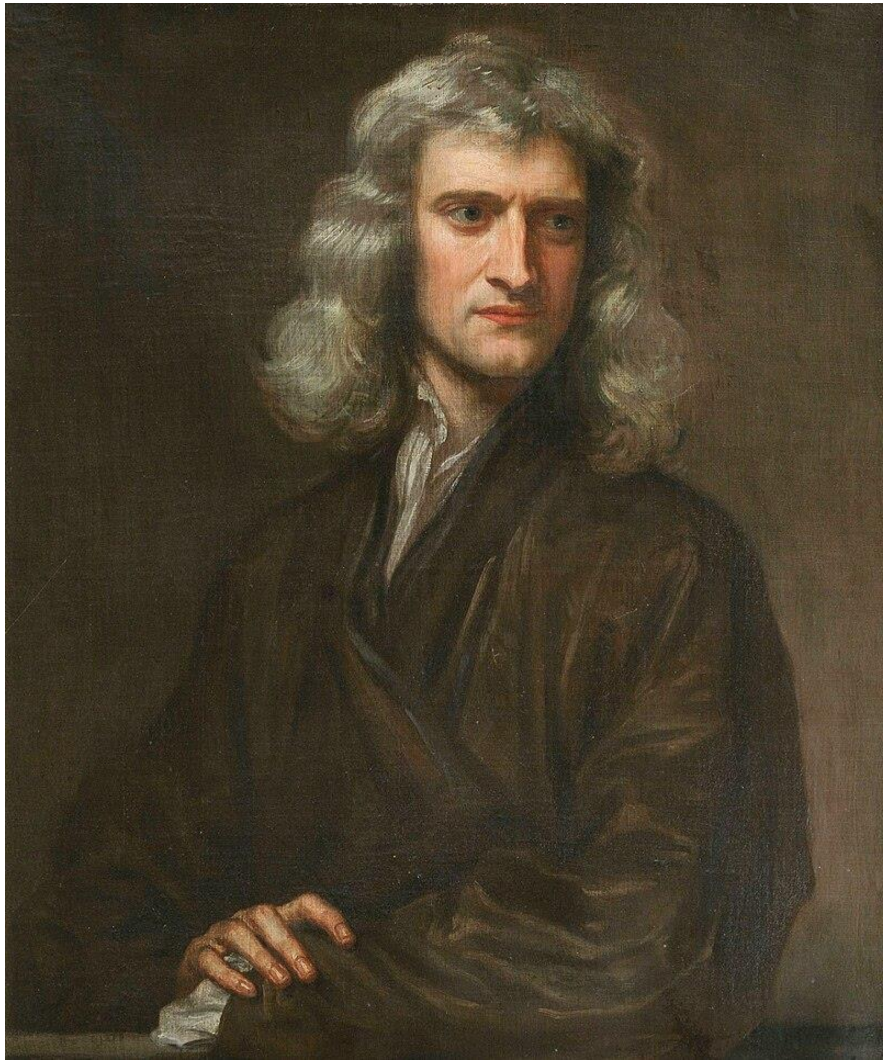




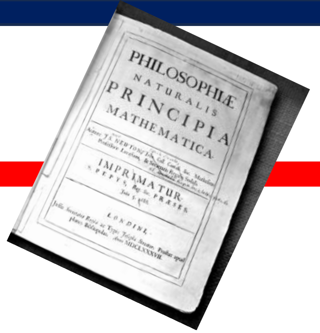
Sir Isaac Newton FRS (25 December 1642 – 20 March 1726/27) was an English polymath active as a mathematician, physicist, astronomer, alchemist, theologian, and author who was described in his time as a natural philosopher. He was a key figure in the Scientific Revolution and the Enlightenment that followed. His pioneering book Philosophiæ Naturalis Principia Mathematica (Mathematical Principles of Natural Philosophy), first published in 1687, consolidated many previous results and established classical mechanics. Newton also made seminal contributions to optics, and shares credit with German mathematician Gottfried Wilhelm Leibniz for developing infinitesimal calculus, though notably he developed calculus well before Leibniz. He is considered one of the greatest and most influential scientists in history. In the Principia, Newton formulated the laws of motion and universal gravitation that formed the dominant scientific viewpoint for centuries until it was superseded by the theory of relativity.

Isaac Newton

Newton used his mathematical description of gravity to derive Kepler's laws of planetary motion, account for tides, the trajectories of comets, the precession of the equinoxes and other phenomena, eradicating doubt about the Solar System's heliocentricity. He demonstrated that the motion of objects on Earth and celestial bodies could be accounted for by the same principles. Newton's inference that the Earth is an oblate spheroid was later confirmed by the geodetic measurements of Maupertuis, La Condamine, and others, convincing most European scientists of the superiority of Newtonian mechanics over earlier systems. Newton built the first practical reflecting telescope and developed a sophisticated theory of colour based on the observation that a prism separates white light into the colours of the visible spectrum. His work on light was collected in his highly influential book Opticks, published in 1704. He also formulated an empirical law of cooling, made the first theoretical calculation of the speed of sound, and introduced the notion of a Newtonian fluid.



Isaac Newton

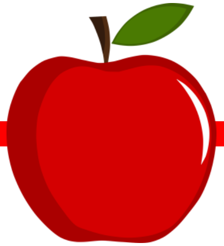


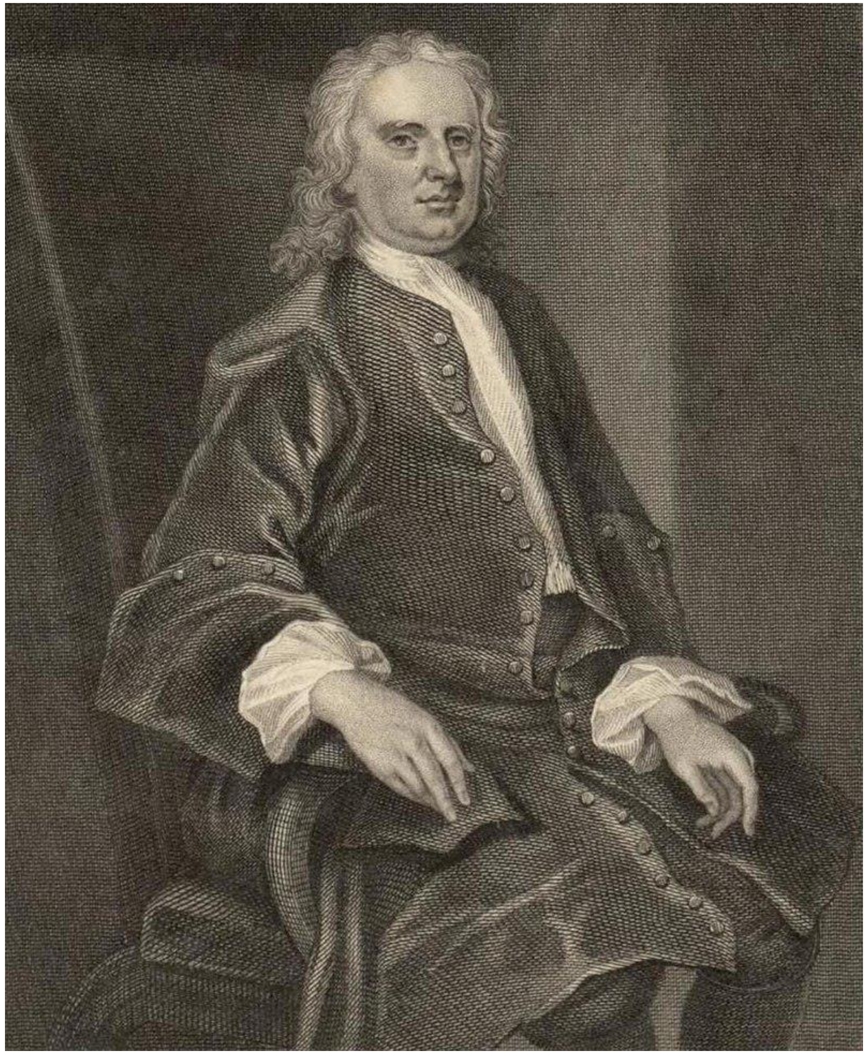
In addition to his work on calculus, as a mathematician Newton contributed to the study of power series, generalised the binomial theorem to non-integer exponents, developed a method for approximating the roots of a function, and classified most of the cubic plane curves.

Newton was a fellow of Trinity College and the second Lucasian Professor of Mathematics at the University of Cambridge. He was a devout but unorthodox Christian who privately rejected the doctrine of the Trinity. He refused to take holy orders in the Church of England, unlike most members of the Cambridge faculty of the day. Beyond his work on the mathematical sciences, Newton dedicated much of his time to the study of alchemy and biblical chronology, but most of his work in those areas remained unpublished until long after his death. Politically and personally tied to the Whig party, Newton served two brief terms as Member of Parliament for the University of Cambridge, in 1689–1690 and 1701–1702. He was knighted by Queen Anne in 1705 and spent the last three decades of his life in London, serving as Warden (1696–1699) and Master (1699–1727) of the Royal Mint, as well as president of the Royal Society (1703–1727).

Isaac Newton was born (according to the Julian calendar in use in England at the time) on Christmas Day, 25 December 1642 (NS 4 January 1643) at Woolsthorpe Manor in Woolsthorpe-by-Colsterworth, a hamlet in the county of Lincolnshire.

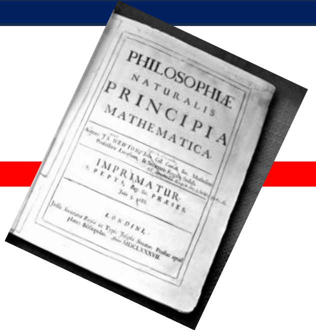
Isaac Newton





His father, also named Isaac Newton, had died three months before. Born prematurely, Newton was a small child; his mother Hannah Ayscough reportedly said that he could have fit inside a quart mug. When Newton was three, his mother remarried and went to live with her new husband, the Reverend Barnabas Smith, leaving her son in the care of his maternal grandmother, Margery Ayscough (née Blythe). Newton disliked his stepfather and maintained some enmity towards his mother for marrying him, as revealed by this entry in a list of sins committed up to the age of 19: "Threatening my father and mother Smith to burn them and the house over them." Newton's mother had three children (Mary, Benjamin, and Hannah) from her second marriage. From the age of about twelve until he was seventeen, Newton was educated at The King's School in Grantham, which taught Latin and Ancient Greek and probably imparted a significant foundation of mathematics. He was removed from school and returned to Woolsthorpe-by-Colsterworth by October 1659.

Isaac Newton



His mother, widowed for the second time, attempted to make him a farmer, an occupation he hated. Henry Stokes, master at The King's School, persuaded his mother to send him back to school. Motivated partly by a desire for revenge against a schoolyard bully, he became the top-ranked student, distinguishing himself mainly by building sundials and models of windmills.

University of Cambridge

In June 1661, Newton was admitted to Trinity College at the University of Cambridge. His uncle Reverend William Ayscough, who had studied at Cambridge, recommended him to the university. At Cambridge, Newton started as a subsizar, paying his way by performing valet duties until he was awarded a scholarship in 1664, which covered his university costs for four more years until the completion of his MA. At the time, Cambridge's teachings were based on those of Aristotle, whom Newton read along with then more modern philosophers, including Descartes and astronomers such as Galileo Galilei and Thomas Street. He set down in his notebook a series of "Quaestiones" about mechanical philosophy as he found it. In 1665, he discovered the generalised binomial theorem and began to develop a mathematical theory that later became calculus.

Isaac Newton

Soon after Newton obtained his BA degree at Cambridge in August 1665, the university temporarily closed as a precaution against the Great Plague.

Although he had been undistinguished as a Cambridge student, Newton's private studies at his home in Woolsthorpe over the next two years saw the development of his theories on calculus, optics, and the law of gravitation.

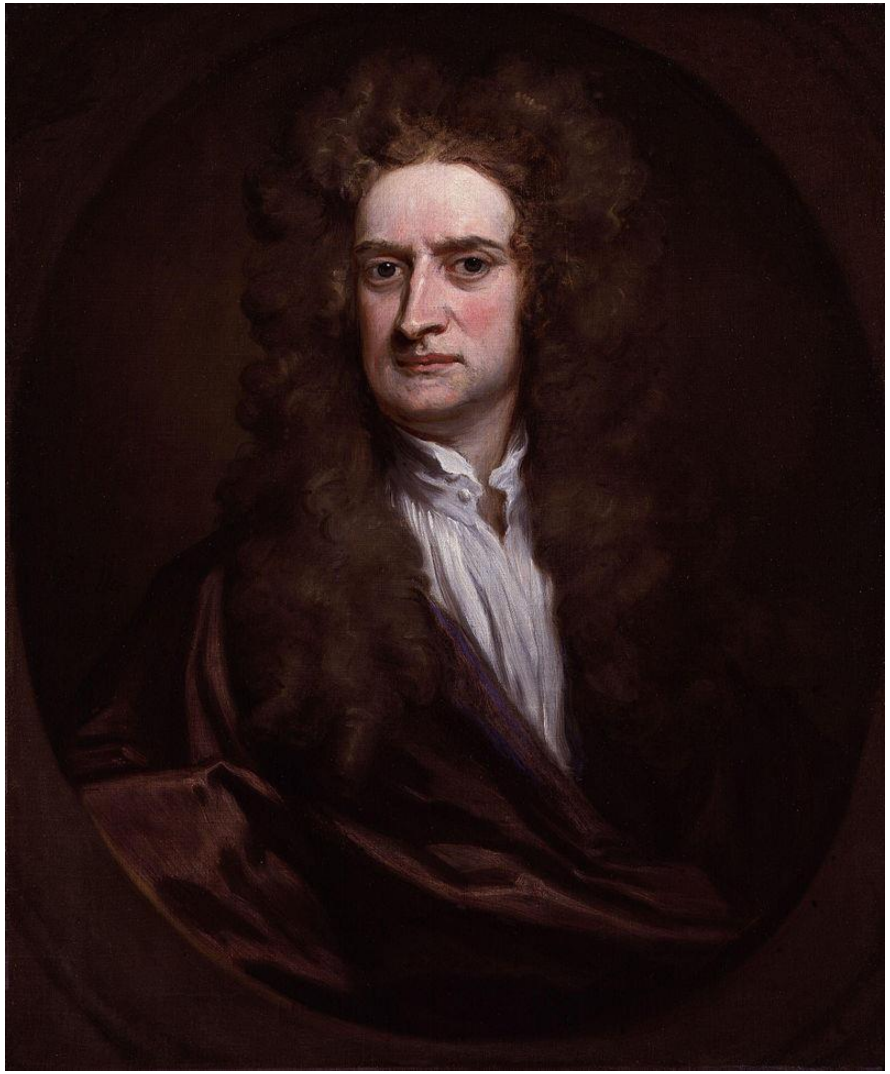
In April 1667, Newton returned to the University of Cambridge, and in October he was elected as a fellow of Trinity. Fellows were required to take holy orders and be ordained as Anglican priests, although this was not enforced in the Restoration years, and an assertion of conformity to the Church of England was sufficient. He made the commitment that "I will either set Theology as the object of my studies and will take holy orders when the time prescribed by these statutes [7 years] arrives, or I will resign from the college. Up until this point he had not thought much about religion and had twice signed his agreement to the Thirty-nine Articles, the basis of Church of England doctrine. By 1675 the issue could not be avoided, and by then his unconventional views stood in the way.

Isaac Newton

He was born there on 4 January 1643. At that time, it was a yeoman's farmstead, principally rearing sheep.

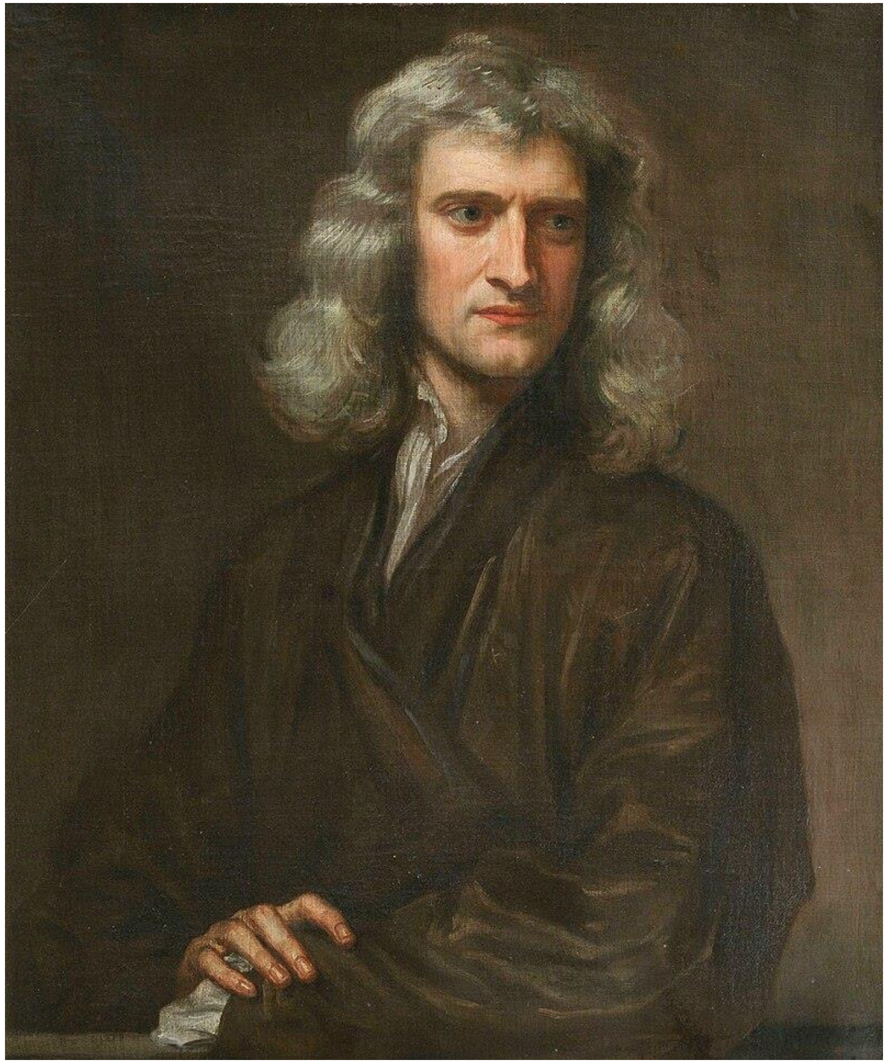
Newton returned here in 1666 when Cambridge University closed due to the plague, and here, he performed many of his most famous experiments, most notably his work on light and optics. This is also said to be the site where Newton, observing an apple fall from a tree, was inspired to formulate his law of universal gravitation.

Now in the hands of the National Trust and open to the public all year round, it is presented as a typical seventeenth century yeoman's farmhouse (or as near to that as possible, taking into account modern living, health and safety requirements and structural changes that have been made to the house since Newton's time).

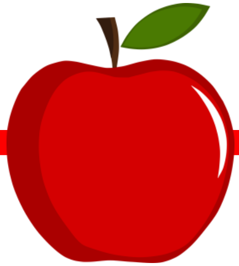


Isaac Newton

Woolsthorpe Manor in Woolsthorpe-by-Colsterworth, near Grantham, Lincolnshire, England, is the birthplace and was the family home of Sir Isaac Newton.



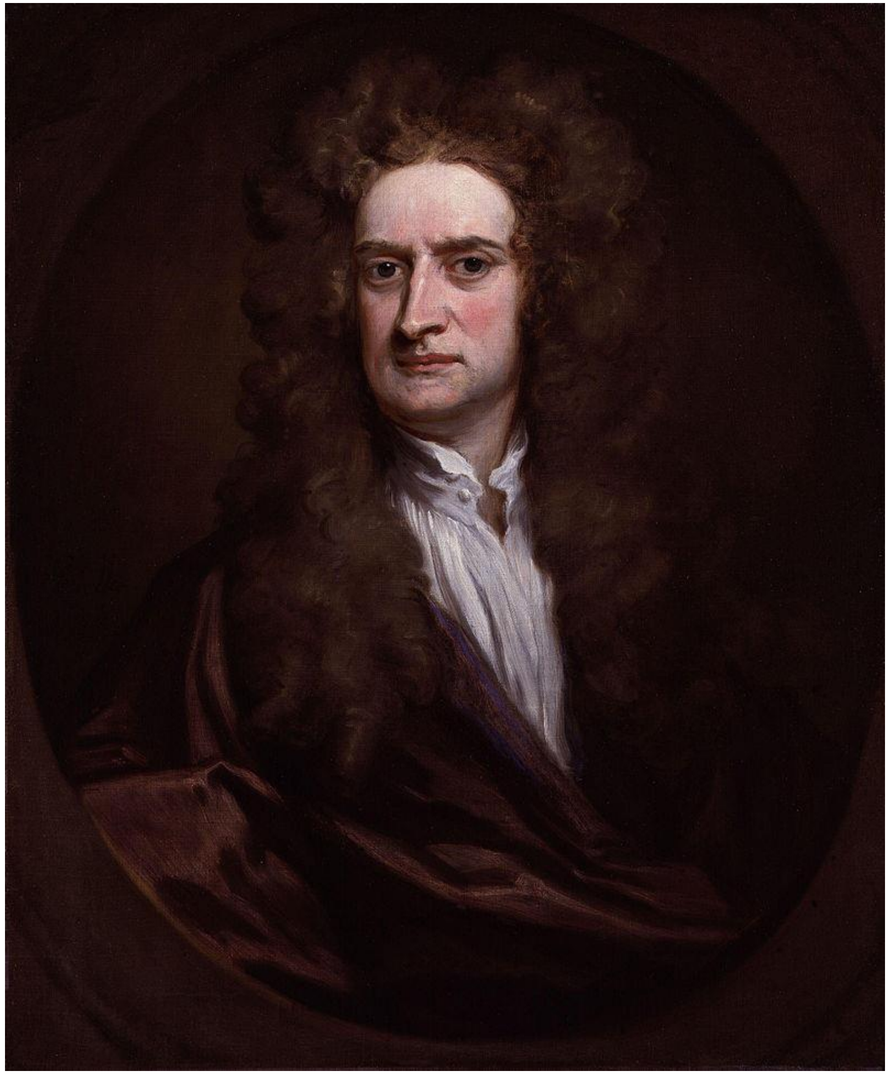
Isaac Newton



His academic work impressed the Lucasian professor Isaac Barrow, who was anxious to develop his own religious and administrative potential (he became master of Trinity College two years later); in 1669, Newton succeeded him, only one year after receiving his MA. The terms of the Lucasian professorship required that the holder not be active in the church – presumably[weasel words] to leave more time for science.

Newton argued that this should exempt him from the ordination requirement, and King Charles II, whose permission was needed, accepted this argument; thus, a conflict between Newton's religious views and Anglican orthodoxy was averted.

Newton was elected a Fellow of the Royal Society (FRS) in 1672.

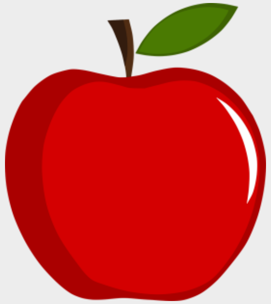


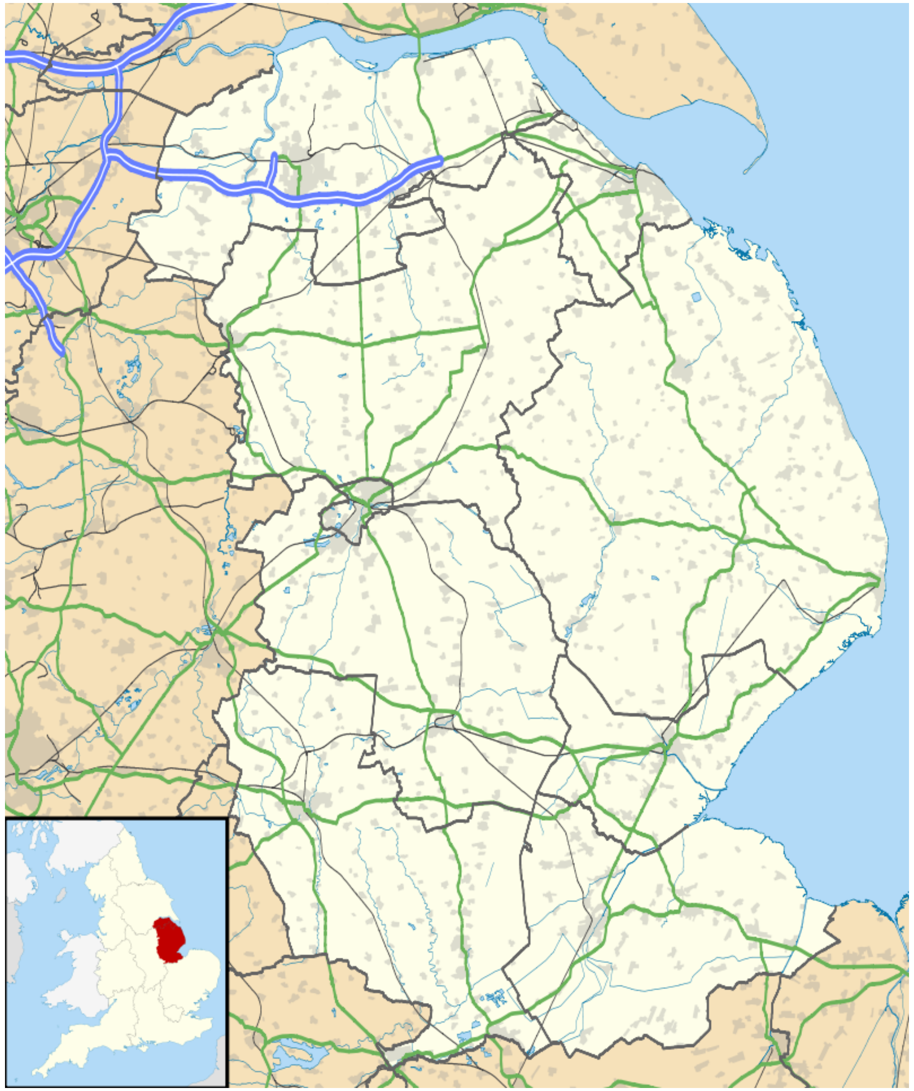
Isaac Newton

New areas of the house, once private, were opened up to the public in 2003, with the old rear steps (that once led up to the hay loft and grain store and often seen in drawings of the period) being rebuilt, and the old walled kitchen garden, to the rear of the house, being restored.

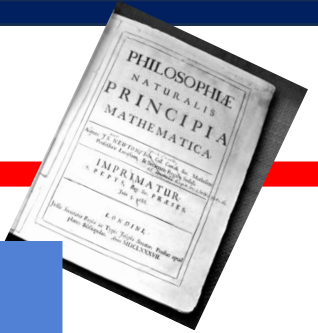
One of the former farmyard buildings has been equipped so that visitors can have hands-on experience of the physical principles investigated by Newton in the house.

It is a Grade I listed building. Isaac Newton recounted to his contemporary William Stukeley how an apple tree in the orchard inspired him to work on his law of universal gravitation. Dendrochronology confirms one of the trees in the orchard to be over 400 years old.

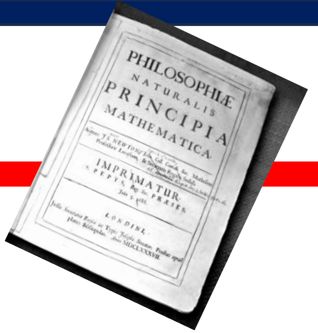




Isaac Newton



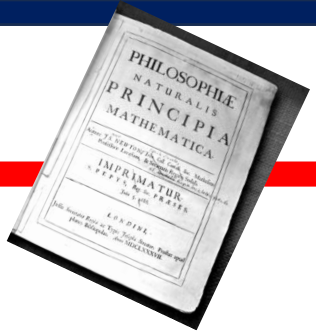
Isaac Newton



Newton's work has been said "to distinctly advance every branch of mathematics then studied". His work on the subject, usually referred to as fluxions or calculus, seen in a manuscript of October 1666, is now published among Newton's mathematical papers. His work De analysi per aequationes numero terminorum infinitas, sent by Isaac Barrow to John Collins in June 1669, was identified by Barrow in a letter sent to Collins that August as the work "of an extraordinary genius and proficiency in these things"Newton later became involved in a dispute with Leibniz over priority in the development of calculus (the Leibniz–Newton calculus controversy). Most modern historians believe that Newton and Leibniz developed calculus independently, although with very different mathematical notations. However, it is established that Newton came to develop calculus much earlier than Leibniz. Leibniz's notation and "differential Method", nowadays recognised as much more convenient notations, were adopted by continental European mathematicians, and after 1820 or so, also by British mathematicians.

A replica of the reflecting telescope Newton presented to the Royal Society in 1672

Isaac Newton



His work extensively uses calculus in geometric form based on limiting values of the ratios of vanishingly small quantities: in the Principia itself, Newton gave demonstration of this under the name of "the method of first and last ratios"[38] and explained why he put his expositions in this form, remarking also that "hereby the same thing is performed as by the method of indivisibles.

Because of this, the Principia has been called "a book dense with the theory and application of the infinitesimal calculus" in modern times and in Newton's time "nearly all of it is of this calculus. His use of methods involving "one or more orders of the infinitesimally small" is present in his De motu corporum in gyrum of 1684 and in his papers on motion "during the two decades preceding 1684.

Newton had been reluctant to publish his calculus because he feared controversy and criticism. He was close to the Swiss mathematician Nicolas Fatio de Duillier. In 1691, Duillier started to write a new version of Newton's Principia, and corresponded with Leibniz. In 1693, the relationship between Duillier and Newton deteriorated and the book was never completed.

Isaac Newton

Starting in 1699, other members of the Royal Society accused Leibniz of plagiarism. The dispute then broke out in full force in 1711 when the Royal Society proclaimed in a study that it was Newton who was the true discoverer and labelled Leibniz a fraud; it was later found that Newton wrote the study's concluding remarks on Leibniz. Thus began the bitter controversy which marred the lives of both Newton and Leibniz until the latter's death in 1716.

Newton is generally credited with the generalised binomial theorem, valid for any exponent. He discovered Newton's identities, Newton's method, classified cubic plane curves (polynomials of degree three in two variables), made substantial contributions to the theory of finite differences, and was the first to use fractional indices and to employ coordinate geometry to derive solutions to Diophantine equations.

He approximated partial sums of the harmonic series by logarithms (a precursor to Euler's summation formula) and was the first to use power series with confidence and to revert power series. Newton's work on infinite series was inspired by Simon Stevin's decimals.

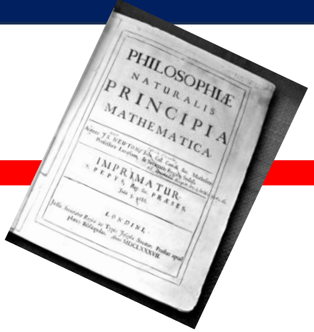
Isaac Newton

In 1666, Newton observed that the spectrum of colours exiting a prism in the position of minimum deviation is oblong, even when the light ray entering the prism is circular, which is to say, the prism refracts different colours by different angles. This led him to conclude that colour is a property intrinsic to light – a point which had, until then, been a matter of debate.
From 1670 to 1672, Newton lectured on optics.

During this period he investigated the refraction of light, demonstrating that the multicoloured image produced by a prism, which he named a spectrum, could be recomposed into white light by a lens and a second prism. Modern scholarship has revealed that Newton's analysis and resynthesis of white light owes a debt to corpuscular alchemy. He showed that coloured light does not change its properties by separating out a coloured beam and shining it on various objects, and that regardless of whether reflected, scattered, or transmitted, the light remains the same colour.

A replica of the reflecting telescope Newton presented to the Royal Society in 1672

Isaac Newton



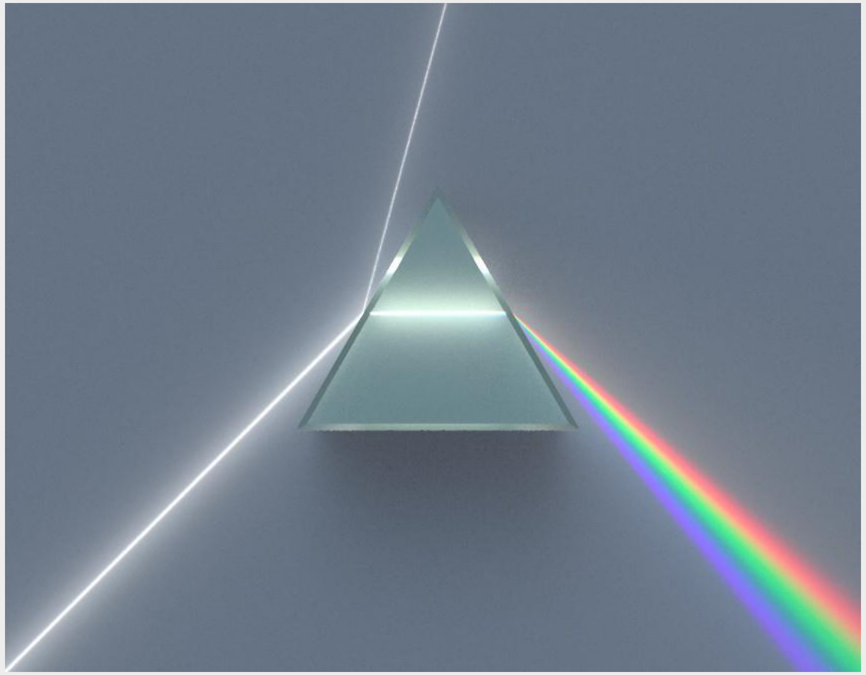


Illustration of a dispersive prism separating white light into the colours of the spectrum, as discovered by Newton

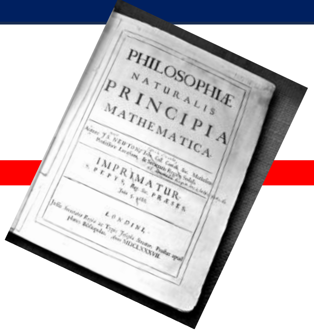
A replica of the reflecting telescope Newton presented to the Royal Society in 1672

Isaac Newton

From this work, he concluded that the lens of any refracting telescope would suffer from the dispersion of light into colours (chromatic aberration). As a proof of the concept, he constructed a telescope using reflective mirrors instead of lenses as the objective to bypass that problem. Building the design, the first known functional reflecting telescope, today known as a Newtonian telescope, involved solving the problem of a suitable mirror material and shaping technique.

Newton ground his own mirrors out of a custom composition of highly reflective speculum metal, using Newton's rings to judge the quality of the optics for his telescopes. In late 1668, he was able to produce this first reflecting telescope. It was about eight inches long and it gave a clearer and larger image. In 1671, the Royal Society asked for a demonstration of his reflecting telescope. Their interest encouraged him to publish his notes, Of Colours, which he later expanded into the work Opticks. When Robert Hooke criticised some of Newton's ideas, Newton was so offended that he withdrew from public debate. Newton and Hooke had brief exchanges in 1679–80, when Hooke, appointed to manage the Royal Society's correspondence, opened up a correspondence intended to elicit contributions from Newton to Royal Society transactions, which had the effect of stimulating Newton to work out a proof that the elliptical form of planetary orbits would result from a centripetal force inversely proportional to the square of the radius vector. But the two men remained generally on poor terms until Hooke's death.

Isaac Newton

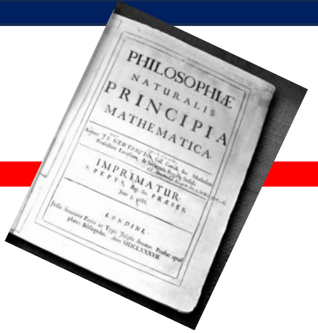


Newton argued that light is composed of particles or corpuscles, which were refracted by accelerating into a denser medium. He verged on soundlike waves to explain the repeated pattern of reflection and transmission by thin films (Opticks Bk. II, Props. 12), but still retained his theory of 'fits' that disposed corpuscles to be reflected or transmitted (Props.13). However, later physicists favoured a purely wavelike explanation of light to account for the interference patterns and the general phenomenon of diffraction. Today's quantum mechanics, photons, and the idea of wave–particle duality bear only a minor resemblance to Newton's understanding of light.

In his Hypothesis of Light of 1675, Newton posited the existence of the ether to transmit forces between particles. The contact with the Cambridge Platonist philosopher Henry More revived his interest in alchemy. He replaced the ether with occult forces based on Hermetic ideas of attraction and repulsion between particles. John Maynard Keynes, who acquired many of Newton's writings on alchemy, stated that "Newton was not the first of the age of reason: He was the last of the magicians.

Newton's contributions to science cannot be isolated from his interest in alchemy. This was at a time when there was no clear distinction between alchemy and science, and had he not relied on the occult idea of action at a distance, across a vacuum, he might not have developed his theory of gravity.

Isaac Newton

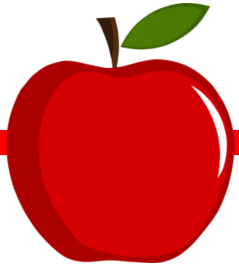


In 1704, Newton published Opticks, in which he expounded his corpuscular theory of light. He considered light to be made up of extremely subtle corpuscles, that ordinary matter was made of grosser corpuscles and speculated that through a kind of alchemical transmutation "Are not gross Bodies and Light convertible into one another, ... and may not Bodies receive much of their Activity from the Particles of Light which enter their Composition Newton also constructed a primitive form of a frictional electrostatic generator, using a glass globe.

In his book Opticks, Newton was the first to show a diagram using a prism as a beam expander, and also the use of multiple-prism arrays. Some 278 years after Newton's discussion, multiple-prism beam expanders became central to the development of narrow-linewidth tunable lasers. Also, the use of these prismatic beam expanders led to the multiple-prism dispersion theory.

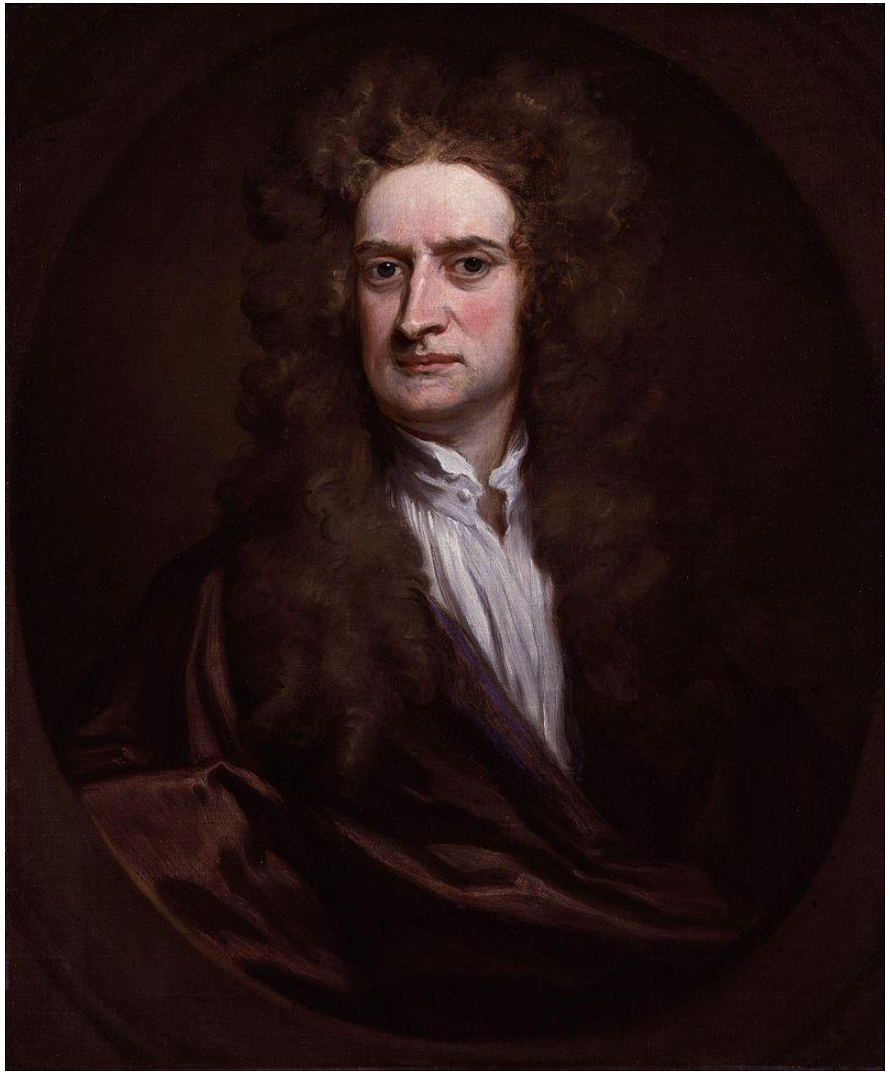
Subsequent to Newton, much has been amended. Young and Fresnel discarded Newton's particle theory in favour of Huygens' wave theory to show that colour is the visible manifestation of light's wavelength. Science also slowly came to realise the difference between perception of colour and mathematisable optics.

Isaac Newton

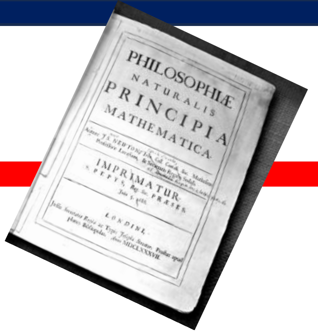


The German poet and scientist, Goethe, could not shake the Newtonian foundation but "one hole Goethe did find in Newton's armour, ... Newton had committed himself to the doctrine that refraction without colour was impossible. He, therefore, thought that the object-glasses of telescopes must forever remain imperfect, achromatism and refraction being incompatible. This inference was proved by Dollond to be wrong.

Newton had been developing his theory of gravitation as far back as 1665. In 1679, Newton returned to his work on celestial mechanics by considering gravitation and its effect on the orbits of planets with reference to Kepler's laws of planetary motion. This followed stimulation by a brief exchange of letters in 1679–80 with Hooke, who had been appointed to manage the Royal Society's correspondence, and who opened a correspondence intended to elicit contributions from Newton to Royal Society transactions.



Isaac Newton



Newton's reawakening interest in astronomical matters received further stimulus by the appearance of a comet in the winter of 1680–1681, on which he corresponded with John Flamsteed. After the exchanges with Hooke, Newton worked out a proof that the elliptical form of planetary orbits would result from a centripetal force inversely proportional to the square of the radius vector. Newton communicated his results to Edmond Halley and to the Royal Society in De motu corporum in gyrum, a tract written on about nine sheets which was copied into the Royal Society's Register Book in December 1684. This tract contained the nucleus that Newton developed and expanded to form the Principia.

The Principia was published on 5 July 1687 with encouragement and financial help from Halley. In this work, Newton stated the three universal laws of motion. Together, these laws describe the relationship between any object, the forces acting upon it and the resulting motion, laying the foundation for classical mechanics.

They contributed to many advances during the Industrial Revolution which soon followed and were not improved upon for more than 200 years. Many of these advances continue to be the underpinnings of non-relativistic technologies in the modern world. He used the Latin word gravitas (weight) for the effect that would become known as gravity, and defined the law of universal gravitation.

Isaac Newton

In the same work, Newton presented a calculus-like method of geometrical analysis using 'first and last ratios', gave the first analytical determination (based on Boyle's law) of the speed of sound in air, inferred the oblateness of Earth's spheroidal figure, accounted for the precession of the equinoxes as a result of the Moon's gravitational attraction on the Earth's oblateness, initiated the gravitational study of the irregularities in the motion of the Moon, provided a theory for the determination of the orbits of comets, and much more. Newton's biographer David Brewster reported that the complexity of applying his theory of gravity to the motion of the moon was so great it affected Newton's health: He was deprived of his appetite and sleep" during his work on the problem in 1692–93, and told the astronomer John Machin that "his head never ached but when he was studying the subject". According to Brewster Edmund Halley also told John Conduitt that when pressed to complete his analysis Newton "always replied that it made his head ache, and kept him awake so often, that he would think of it no more.

Newton made clear his heliocentric view of the Solar System—developed in a somewhat modern way because already in the mid-1680s he recognised the "deviation of the Sun" from the centre of gravity of the Solar System.

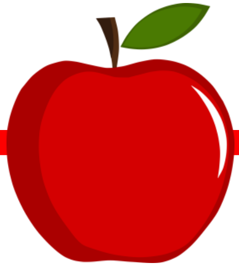
Isaac Newton

For Newton, it was not precisely the centre of the Sun or any other body that could be considered at rest, but rather "the common centre of gravity of the Earth, the Sun and all the Planets is to be esteem'd the Centre of the World", and this centre of gravity "either is at rest or moves uniformly forward in a right line" (Newton adopted the "at rest" alternative in view of common consent that the centre, wherever it was, was at rest).

Newton's postulate of an invisible force able to act over vast distances led to him being criticised for introducing "occult agencies" into science. Later, in the second edition of the Principia (1713), Newton firmly rejected such criticisms in a concluding General Scholium, writing that it was enough that the phenomena implied a gravitational attraction, as they did; but they did not so far indicate its cause, and it was both unnecessary and improper to frame hypotheses of things that were not implied by the phenomena. (Here Newton used what became his famous expression "hypotheses non-fingo.

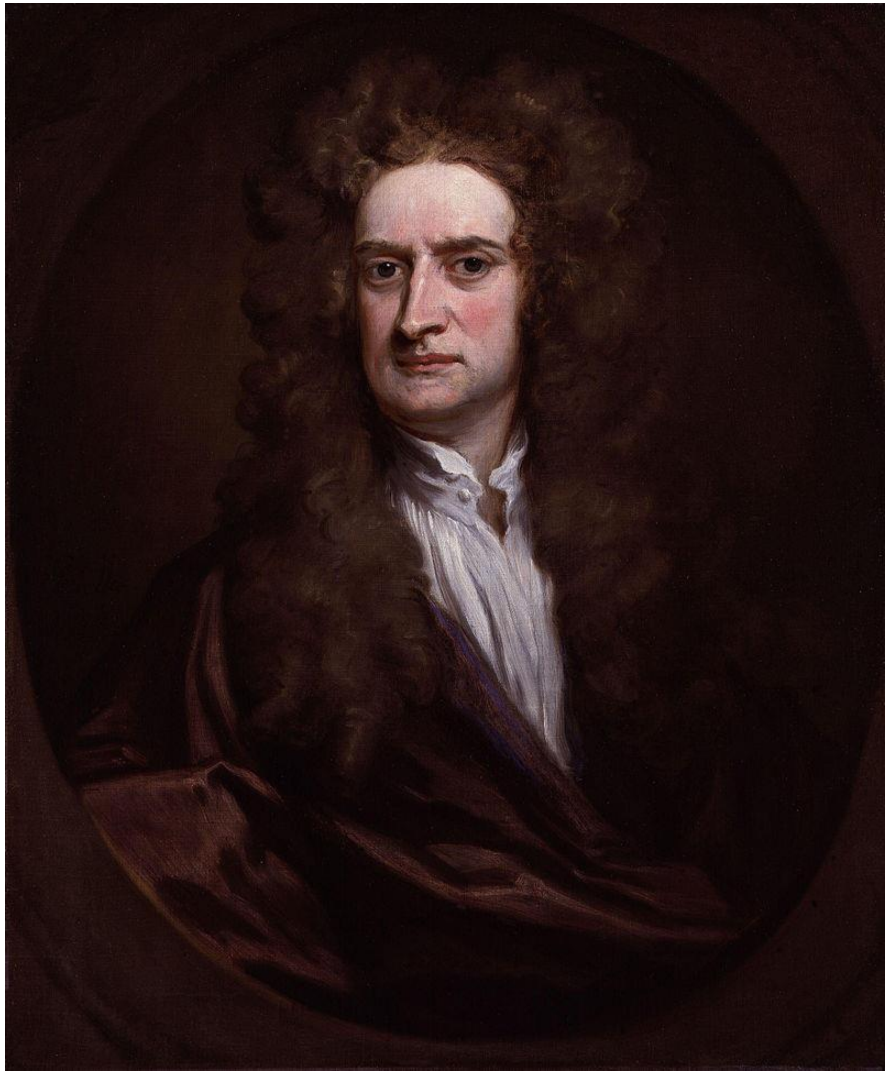
With the Principia, Newton became internationally recognised. He acquired a circle of admirers, including the Swiss-born mathematician Nicolas Fatio de Duillier.

Isaac Newton



In 1710, Newton found 72 of the 78 "species" of cubic curves and categorised them into four types. In 1717, and probably with Newton's help, James Stirling proved that every cubic was one of these four types. Newton also claimed that the four types could be obtained by plane projection from one of them, and this was proved in 1731, four years after his death.

In the 1690s, Newton wrote a number of religious tracts dealing with the literal and symbolic interpretation of the Bible. A manuscript Newton sent to John Locke in which he disputed the fidelity of 1 John 5:7—the Johannine Comma—and its fidelity to the original manuscripts of the New Testament, remained unpublished until 1785.

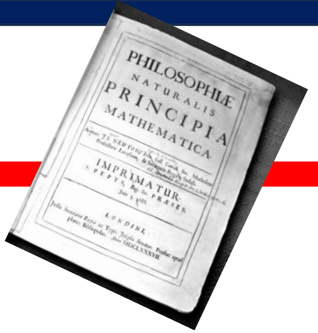


Isaac Newton

Newton was also a member of the Parliament of England for Cambridge University in 1689 and 1701, but according to some accounts his only comments were to complain about a cold draught in the chamber and request that the window be closed. He was, however, noted by Cambridge diarist Abraham de la Pryme to have rebuked students who were frightening locals by claiming that a house was haunted.

Newton moved to London to take up the post of warden of the Royal Mint in 1696, a position that he had obtained through the patronage of Charles Montagu, 1st Earl of Halifax, then Chancellor of the Exchequer. He took charge of England's great recoining, trod on the toes of Lord Lucas, Governor of the Tower, and secured the job of deputy comptroller of the temporary Chester branch for Edmond Halley. Newton became perhaps the best-known Master of the Mint upon the death of Thomas Neale in 1699, a position Newton held for the last 30 years of his life.

Isaac Newton



These appointments were intended as sinecures, but Newton took them seriously. He retired from his Cambridge duties in 1701, and exercised his authority to reform the currency and punish clippers and counterfeiters.

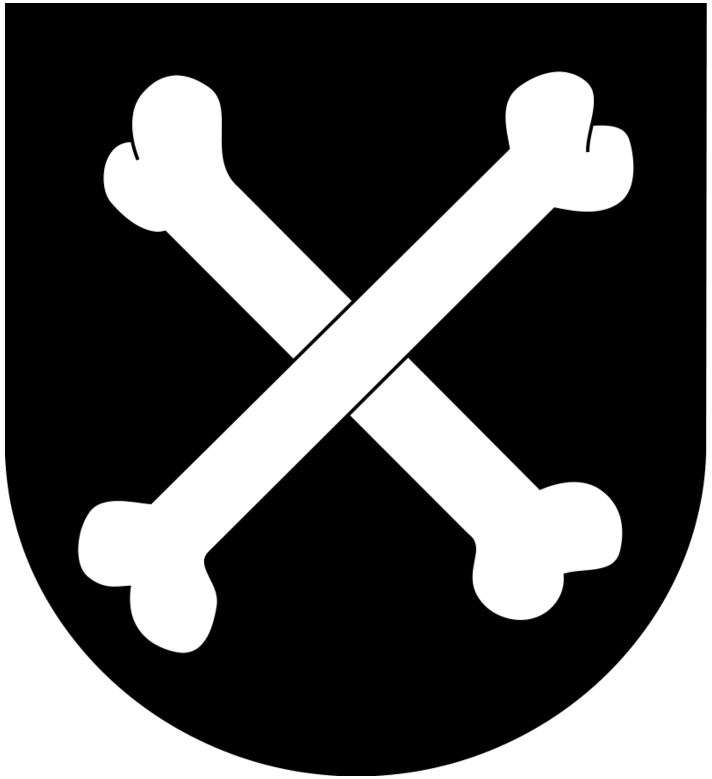
As Warden, and afterwards as Master, of the Royal Mint, Newton estimated that 20 percent of the coins taken in during the Great Recoinage of 1696 were counterfeit. Counterfeiting was high treason, punishable by the felon being hanged, drawn and quartered. Despite this, convicting even the most flagrant criminals could be extremely difficult, but Newton proved equal to the task. Disguised as a habitué of bars and taverns, he gathered much of that evidence himself. For all the barriers placed to prosecution, and separating the branches of government, English law still had ancient and formidable customs of authority. Newton had himself made a justice of the peace in all the home counties.

Isaac Newton

A draft letter regarding the matter is included in Newton's personal first edition of Philosophiæ Naturalis Principia Mathematica, which he must have been amending at the time. Then he conducted more than 100 cross-examinations of witnesses, informers, and suspects between June 1698 and Christmas 1699. Newton successfully prosecuted 28 coiners.

Newton was made president of the Royal Society in 1703 and an associate of the French Académie des Sciences. In his position at the Royal Society, Newton made an enemy of John Flamsteed, the Astronomer Royal, by prematurely publishing Flamsteed's Historia Coelestis Britannica, which Newton had used in his studies.

In April 1705, Queen Anne knighted Newton during a royal visit to Trinity College, Cambridge. The knighthood is likely to have been motivated by political considerations connected with the parliamentary election in May 1705, rather than any recognition of Newton's scientific work or services as Master of the Mint. Newton was the second scientist to be knighted, after Francis Bacon



Isaac Newton

As a result of a report written by Newton on 21 September 1717 to the Lords Commissioners of His Majesty's Treasury, the bimetallic relationship between gold coins and silver coins was changed by royal proclamation on 22 December 1717, forbidding the exchange of gold guineas for more than 21 silver shillings. This inadvertently resulted in a silver shortage as silver coins were used to pay for imports, while exports were paid for in gold, effectively moving Britain from the silver standard to its first gold standard. It is a matter of debate as to whether he intended to do this or not. It has been argued that Newton conceived of his work at the Mint as a continuation of his alchemical work.

Newton was invested in the South Sea Company and lost some £20,000 (£4.4 million in 2020) when it collapsed in around 1720.

Toward the end of his life, Newton took up residence at Cranbury Park, near Winchester, with his niece and her husband, until his death. His half-niece, Catherine Barton, served as his hostess in social affairs at his house on Jermyn Street in London; he was her "very loving Uncle", according to his letter to her when she was recovering from smallpox.

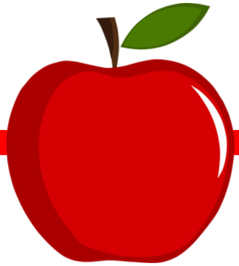
A bubble-era stock promoter, caricatured as a "night wind hawker"

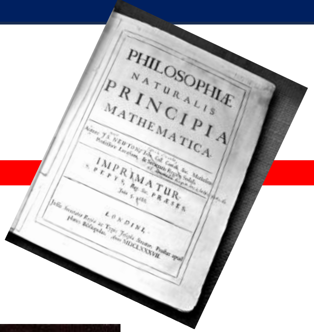
Isaac Newton Death

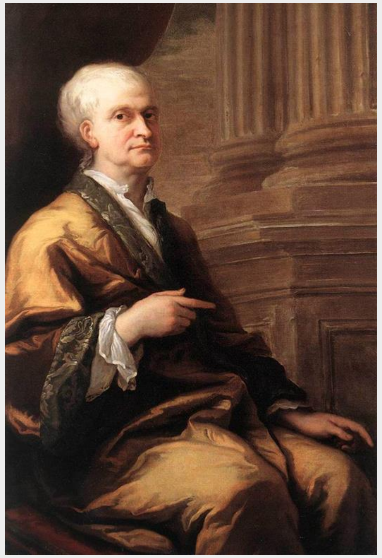
Newton died in his sleep in London on 20 March 1727 (OS 20 March 1726; NS 31 March 1727). He was given a ceremonial funeral, attended by nobles, scientists, and philosophers, and was buried in Westminster Abbey among kings and queens. He was the first scientist to be buried in the abbey. Voltaire may have been present at his funeral. A bachelor, he had divested much of his estate to relatives during his last years, and died intestate. His papers went to John Conduitt and Catherine Barton.
Shortly after his death, a plaster death mask was moulded of Newton. It was used by Flemish sculptor John Michael Rysbrack in making a sculpture of Newton. It is now held by the Royal Society, who created a 3D scan of it in 2012.

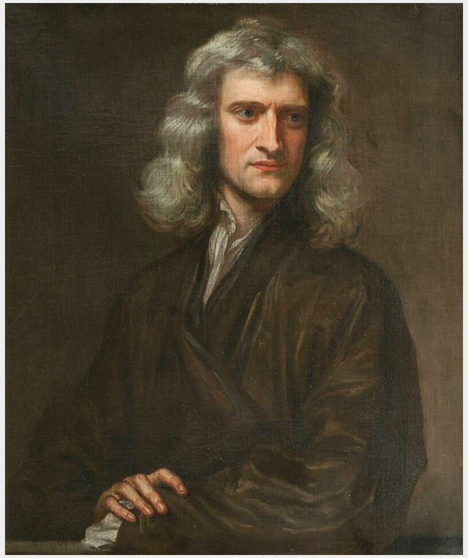
Newton's hair was posthumously examined and found to contain mercury, probably resulting from his alchemical pursuits. Mercury poisoning could explain Newton's eccentricity in late life.

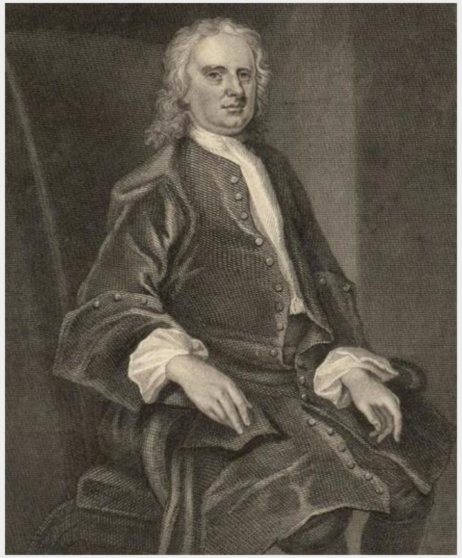
Isaac Newton



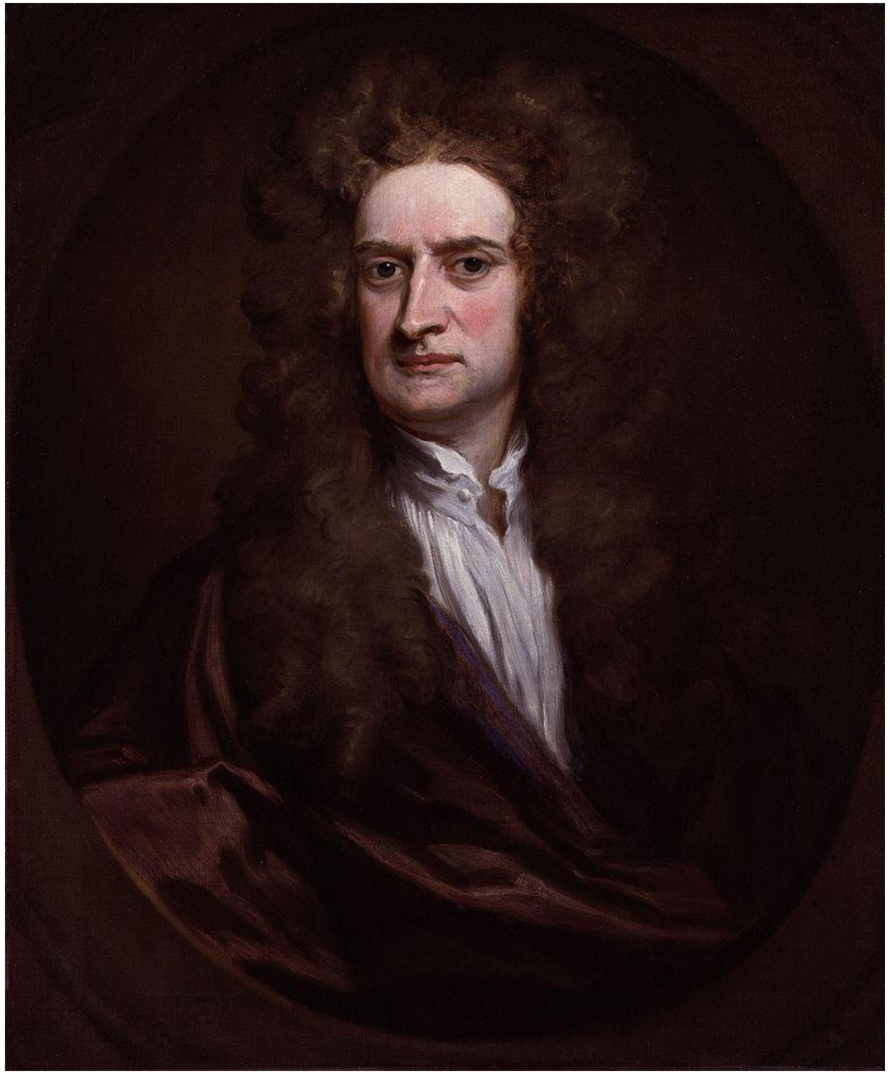








Although it was claimed that he was once engaged, Newton never married. The French writer and philosopher Voltaire, who was in London at the time of Newton's funeral, said that he "was never sensible to any passion, was not subject to the common frailties of mankind, nor had any commerce with women—a circumstance which was assured me by the physician and surgeon who attended him in his last moments".



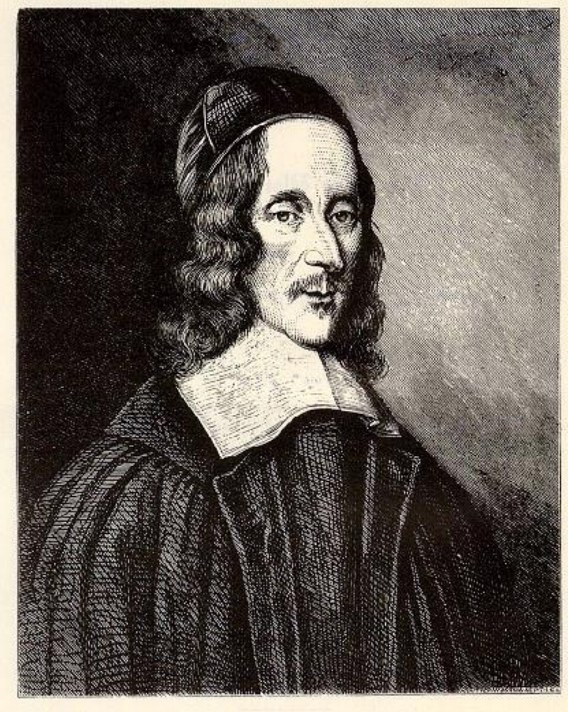
Isaac Newton

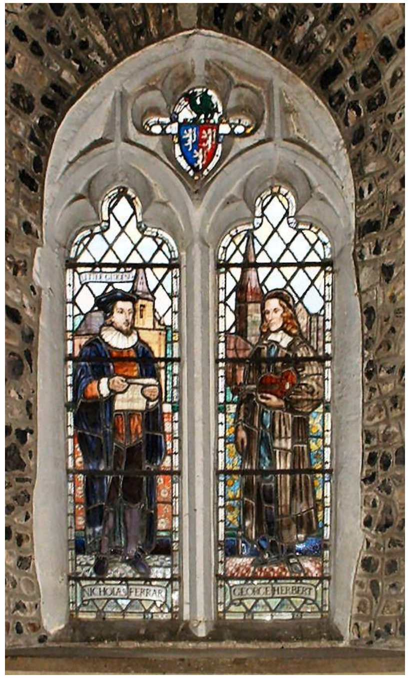
Newton had a close friendship with the Swiss mathematician Nicolas Fatio de Duillier, whom he met in London around 1689[80]—some of their correspondence has survived. Their relationship came to an abrupt and unexplained end in 1693, and at the same time Newton suffered a nervous breakdown, which included sending wild accusatory letters to his friends Samuel Pepys and John Locke. His note to the latter included the charge that Locke "endeavoured to embroil me with woemen.

Newton was relatively modest about his achievements, writing in a letter to Robert Hooke in February 1676, "If I have seen further it is by standing on the shoulders of giants. Two writers think that the sentence, written at a time when Newton and Hooke were in dispute over optical discoveries, was an oblique attack on Hooke (said to have been short and hunchbacked), rather than—or in addition to—a statement of modesty.

On the other hand, the widely known proverb about standing on the shoulders of giants, published among others by seventeenth-century poet George Herbert (a former orator of the University of Cambridge and fellow of Trinity College) in his Jacula Prudentum (1651), had as its main point that "a dwarf on a giant's shoulders sees farther of the two", and so its effect as an analogy would place Newton himself rather than Hooke as the 'dwarf'.

Isaac Newton

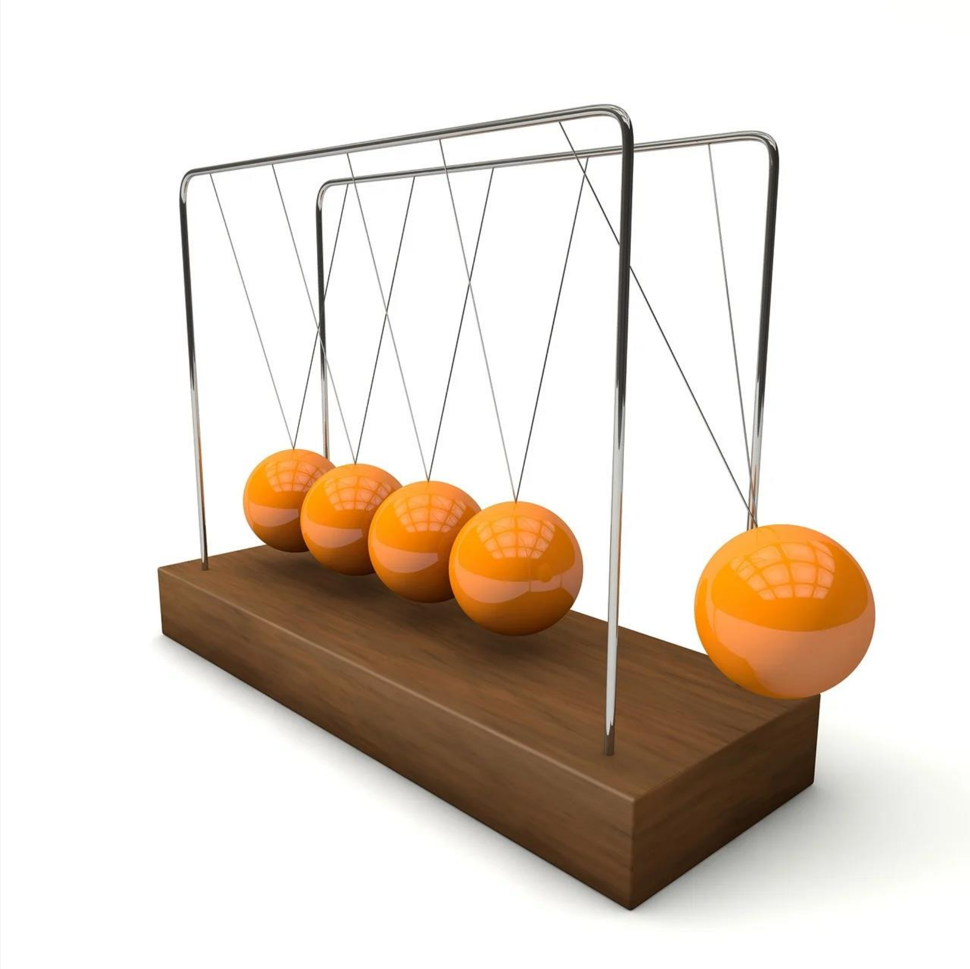




Robert Hooke FRS (/hʊk/; 18 July 1635 – 3 March 1703) was an English polymath active as a scientist, natural philosopher and architect, who is credited to be one of the first two scientists to discover microorganisms in 1665 using a compound microscope

George Herbert (3 April 1593 – 1 March 1633) was an English poet, orator, and priest of the Church of England. His poetry is associated with the writings of the metaphysical poets, and he is recognised as "one of the foremost British devotional lyricists. He was born in Wales into an artistic and wealthy family and largely raised in England. He received a good education that led to his admission to Trinity College, Cambridge, in 1609. He went there with the intention of becoming a priest, but he became the University's Public Orator and attracted the attention of King James I. He sat in the Parliament of England in 1624 and briefly in 1625.

Isaac Newton



In physics, gravity (from Latin gravitas 'weight' is a fundamental interaction which causes mutual attraction between all things that have mass. Gravity is, by far, the weakest of the four fundamental interactions, approximately 1038 times weaker than the strong interaction, 1036 times weaker than the electromagnetic force and 1029 times weaker than the weak interaction. As a result, it has no significant influence at the level of subatomic particles. However, gravity is the most significant interaction between objects at the macroscopic scale, and it determines the motion of planets, stars, galaxies, and even light. On Earth, gravity gives weight to physical objects, and the Moon's gravity is responsible for sublunar tides in the oceans (the corresponding antipodal tide is caused by the inertia of the Earth and Moon orbiting one another). Gravity is most accurately described by the general theory of relativity (proposed by Albert Einstein in 1915)

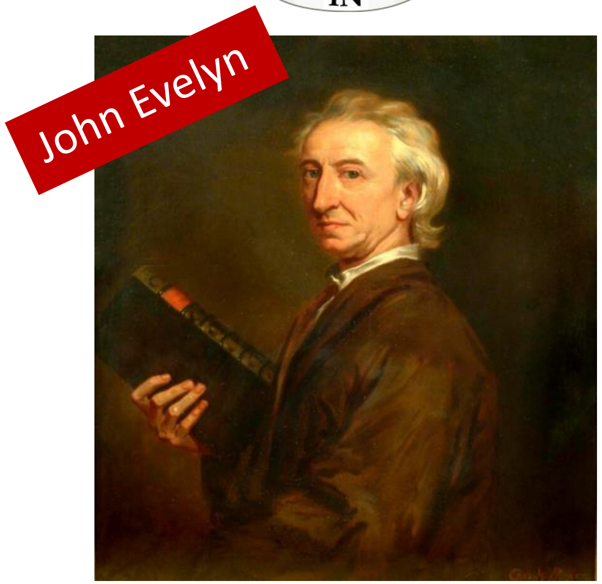
Isaac Newton

The Royal Society, formally The Royal Society of London for Improving Natural Knowledge, is a learned society and the United Kingdom's national academy of sciences. The society fulfils a number of roles: promoting science and its benefits, recognising excellence in science, supporting outstanding science, providing scientific advice for policy, education and public engagement and fostering international and global co-operation. Founded on 28 November 1660, it was granted a royal charter by King Charles II as The Royal Society and is the oldest continuously existing scientific academy in the world.

The Invisible College has been described as a precursor group to the Royal Society of London, consisting of a number of natural philosophers around Robert Boyle. The concept of "invisible college" is mentioned in German Rosicrucian pamphlets in the early 17th century. Ben Jonson in England referenced the idea, related in meaning to Francis Bacon's House of Solomon, in a masque The Fortunate Isles and Their Union from 1624/5.[4] The term accrued currency in the exchanges of correspondence within the Republic of Letters.

Coat of arms of the Royal Society of London

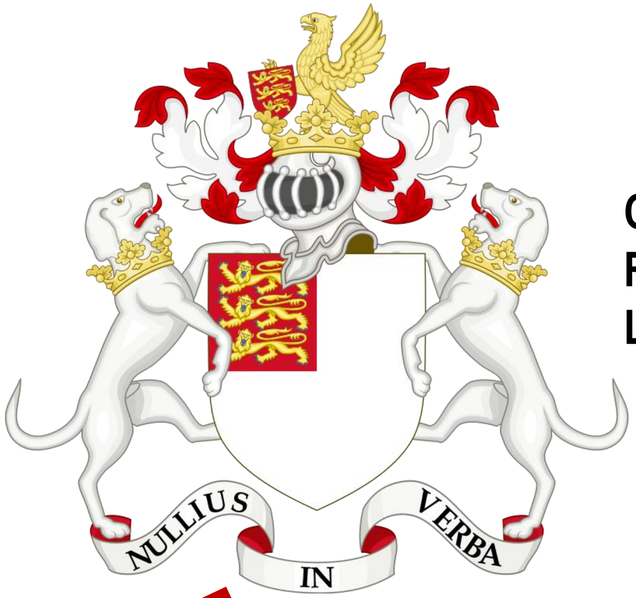
Entrance to the Royal Society at 6–9 Carlton House Terrace, London



Founding Fellow of the Royal Society

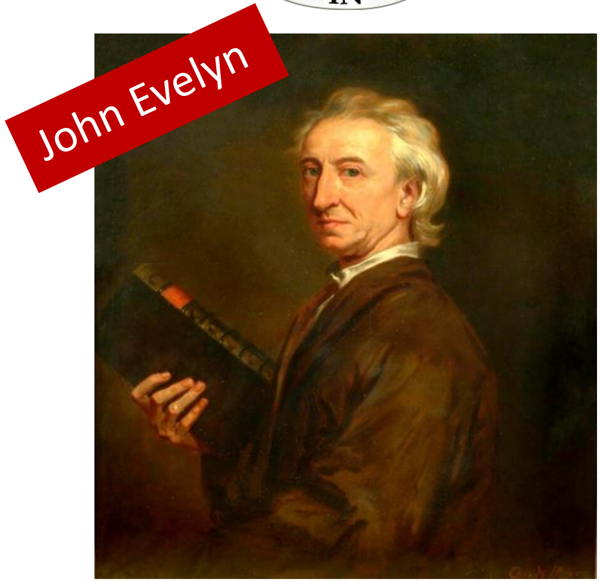
Isaac Newton

On 28 November 1660, which is considered the official foundation date of the Royal Society, a meeting at Gresham College of 12 natural philosophers decided to commence a "Colledge for the Promoting of Physico-Mathematicall Experimentall Learning". Amongst those founders were Christopher Wren, Robert Boyle, John Wilkins, William Brouncker and Robert Moray. At the second meeting, Sir Robert Moray announced that the King approved of the gatherings, and a royal charter was signed on 15 July 1662 which created the "Royal Society of London", with Lord Brouncker serving as the first president. The society's early meetings included experiments performed first by Hooke and then by Denis Papin, who was appointed in 1684. These experiments varied in their subject area, and were both important in some cases and trivial in others. Sir Isaac Newton FRS, President of Royal Society, 1703–1727. Newton was one of the earliest Fellows of the Royal Society, elected in 1672.



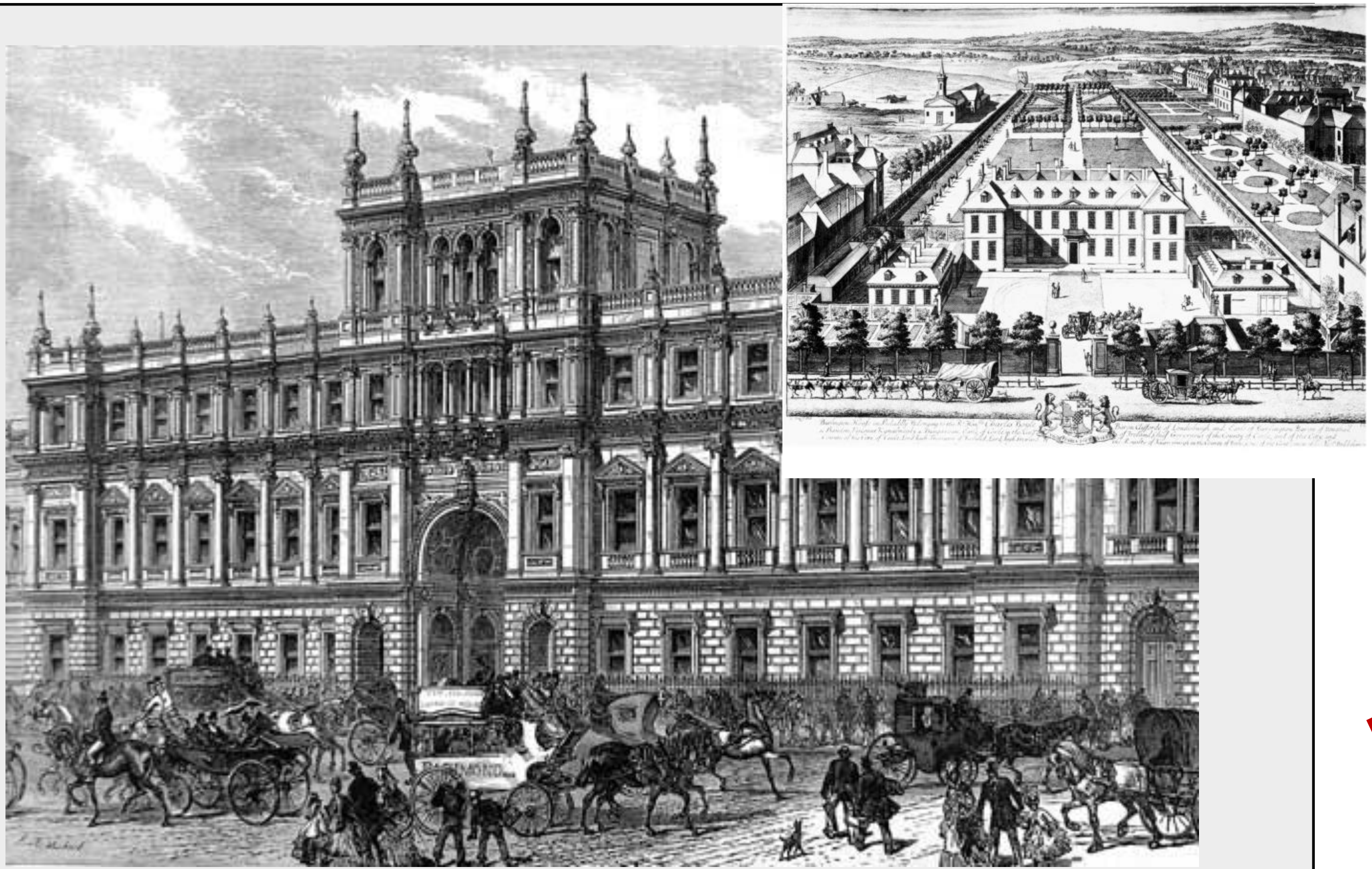
Coat of arms of the Royal Society of London

Entrance to the Royal Society at 6–9 Carlton House Terrace, London

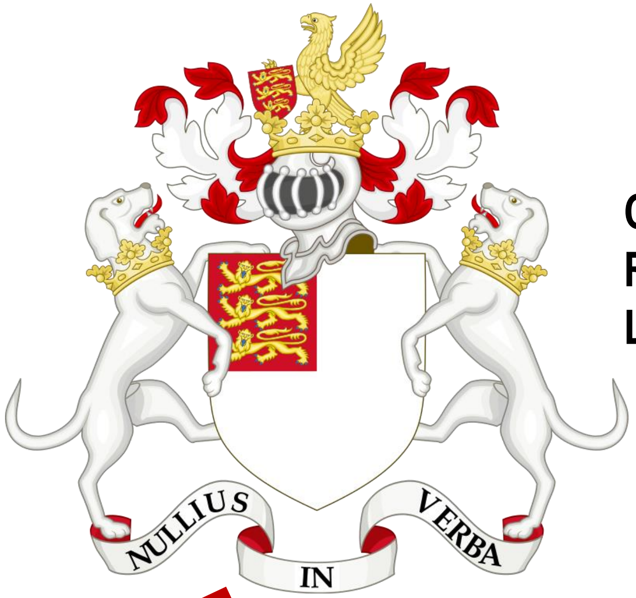


Founding Fellow of the Royal Society

Isaac Newton



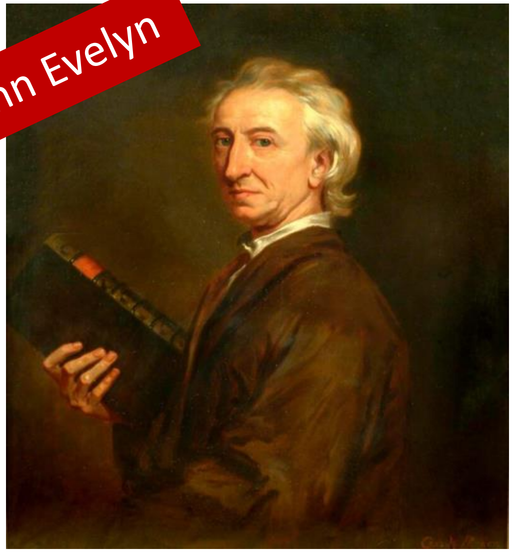
Burlington House, where the Society was based between 1873 and 1967



Coat of arms of the Royal Society of London

Entrance to the Royal Society at 6–9 Carlton House Terrace, London

John Evelyn



Founding Fellow of the Royal Society